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Shoquist et al.

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[54] AUTOMATED PROCUREMENT SYSTEM
WITH MULTI-SYSTEM DATA ACCESS

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[73] Assignee: Texas Instruments Incorporated, Dallas, Tex.

[21] Appl. No.: 560,942

[22] Filed: Jul. 31, 1990

[51] Int. Cl. 5 G06F 15/20

[52] U.S. Cl. 364/401; 364/403

[58] Field of Search 364/401, 408, 403; 395/145, 146, 148, 149, 155, 157, 161, 200, 600, 925, 650

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Primary Examiner—Roy N. Envall, Jr.

Assistant Examiner—A. Bodendorf

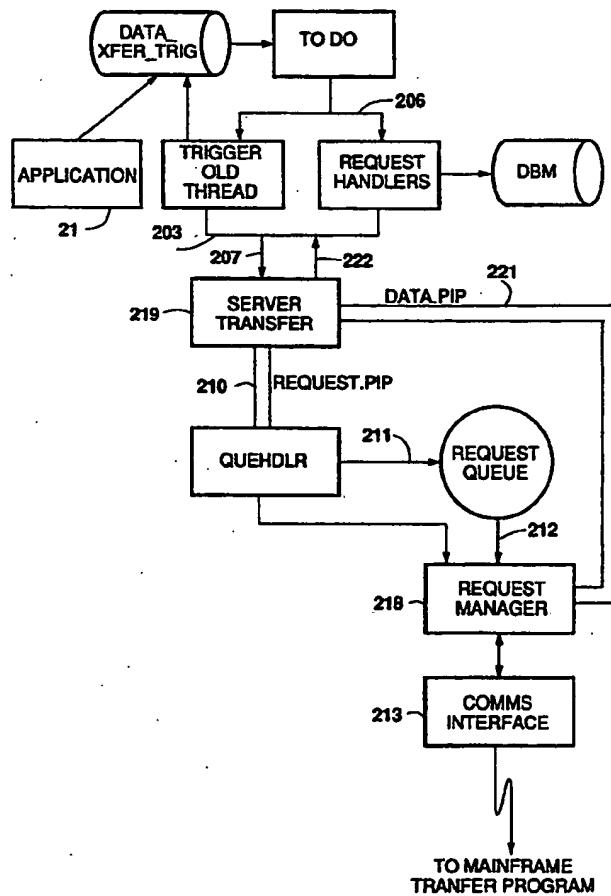
Attorney, Agent, or Firm—W. Daniel Swayze, Jr.; Leo N. Heiting; Richard L. Donaldson

[57]

ABSTRACT

An automated procurement system, in which a buyer workstation is in communication with a mainframe database that stores global data relevant to procurement documents and reports. The workstation is programmed with an interactive buyer interface that displays procurement documents, provides support data to aid in decision-making, and provides various document attachments. Data is uploaded and downloaded to and from the mainframe and the workstation in a manner that is transparent to the buyer.

8 Claims, 25 Drawing Sheets



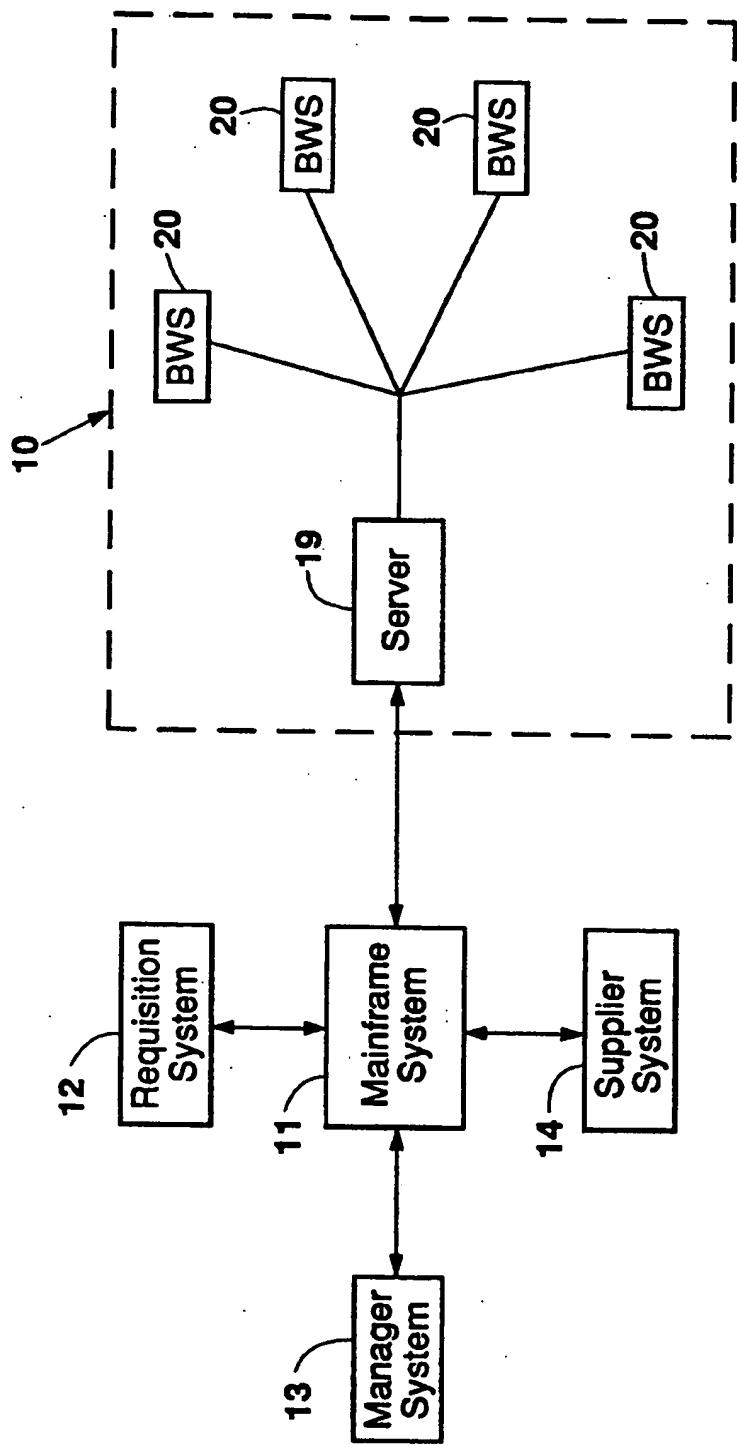


Fig. 1

Fig. 2

Buyer Workstation					
Work Lists		Admin	Support		
Windows		BWSW1008!			
F1=Help					
Buyer Statistics					
RPs:	Buyer Number	0	A/O 00:00		
Waiting Buyer Action	0	New	0		
Waiting Documentation	0	New	0		
Supplier Proposal	0	New	0		
Waiting Supplier Action	0	New	0		
All Quotes Received	0	New	0		
Partial Quotes Received	0	New	0		
All Quotes Outstanding	0	New	0		
PO Change Request:					
Waiting Buyer Action	0	New	0		
Supplier Proposal	0	New	0		
Waiting Supplier Action	0	New	0		

Fig. 3

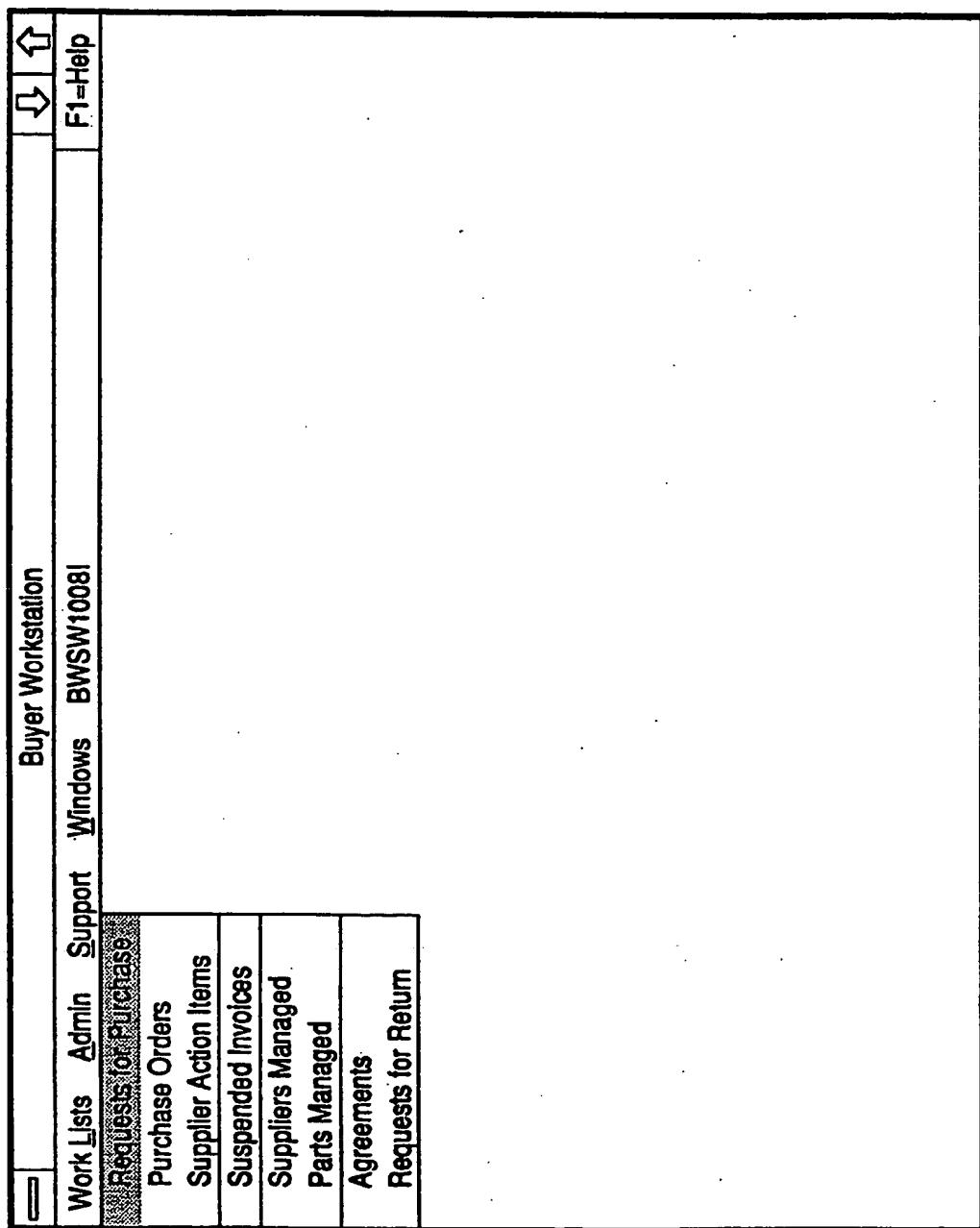


Fig. 4

Buyer Workstation					
Work Lists Admin Support Windows BWSW1008I					
RP Work List - RP Sequence					
Seq	RP Number	TI Part No/ Description	Need Date	Queue Date	Stat
1	1406325220-01	2221574-0001	UNSC	03/01/89	BUYN
	- 140632535-01	2221574-0001	UNSC	03/07/89	BUYN
	- 140632539-01	2220882-0001	UNSC	03/13/89	BUYN
	- 140632540-01	2220823-0008	UNSC	03/07/89	BUYN
	- 140632551-01	0998283-0001	UNSC	03/07/89	BUYN
	- 140637034-01	2782241-0001	UNSC	04/14/89	BUYN
	- 140637216-01	2461821-0001	UNSC	04/17/89	BUYN
	- 140637219-01	2540241-0001	UNSC	04/17/89	BUYN
	- 140637220-01	2548323-0003	UNSC	04/20/89	BUYN
	- 140637221-01	2548238-0001	UNSC	04/20/89	BUYN
	- 140637223-01	2544592-0001	UNSC	04/20/89	BUYN
	- 140637224-01	2546162-0001	UNSC	04/28/89	BUYN
	- 140637225-01	2545866-0001	UNSC	04/20/89	BUYN
	- 140637226-01	2546621-0001	UNSC	04/28/89	BUYN
	- 140637228-01	2542556-0001	UNSC	04/28/89	BUYN
	- 140637229-01	2542556-0001	UNSC	04/28/89	BUYN
	- 140637234-01	2542470-0004	UNSC	04/20/89	BUYN
	- 140637235-01	2311110-0001	UNSC	04/17/89	BUYN
	- 140637236-01	2311108-0004	UNSC	04/20/89	BUYN

Fig. 5

Buyer Workstation		↓	↑																																																																								
<input type="button" value="Work Lists"/>	<input type="button" value="Admin"/>	<input type="button" value="Support"/>	<input type="button" value="Windows"/>																																																																								
BWSW1008!		<input type="button" value="F1=Help"/>																																																																									
<input type="button" value="Sel 0"/>	RP Number	TI P Des																																																																									
<table border="1"> <tr> <td>1</td> <td>1406323535-01</td> <td>2221574</td> <td>679</td> </tr> <tr> <td>2</td> <td>-140632539-01</td> <td>2220682</td> <td>217</td> </tr> <tr> <td>3</td> <td>-140632540-01</td> <td>2220623</td> <td>679</td> </tr> <tr> <td>4</td> <td>-140632551-01</td> <td>0996283</td> <td>679</td> </tr> <tr> <td>5</td> <td>-1406327034-01</td> <td>2782241</td> <td>679</td> </tr> <tr> <td>6</td> <td>-1406327216-01</td> <td>2451821</td> <td>679</td> </tr> <tr> <td>7</td> <td>-1406327219-01</td> <td>2540241</td> <td>679</td> </tr> <tr> <td>8</td> <td>-1406327220-01</td> <td>2548323</td> <td>679</td> </tr> <tr> <td>9</td> <td>-1406327221-01</td> <td>2548236</td> <td>679</td> </tr> <tr> <td>10</td> <td>-1406327223-01</td> <td>2544592</td> <td>679</td> </tr> <tr> <td>11</td> <td>-1406327224-01</td> <td>2546162</td> <td>679</td> </tr> <tr> <td>12</td> <td>-1406327225-01</td> <td>2545666</td> <td>679</td> </tr> <tr> <td>13</td> <td>-1406327226-01</td> <td>2546621</td> <td>679</td> </tr> <tr> <td>14</td> <td>-1406327228-01</td> <td>2542556</td> <td>679</td> </tr> <tr> <td>15</td> <td>-1406327229-01</td> <td>2542556</td> <td>679</td> </tr> <tr> <td>16</td> <td>-1406327234-01</td> <td>2542470</td> <td>679</td> </tr> <tr> <td>17</td> <td>-1406327235-01</td> <td>2311110</td> <td>679</td> </tr> <tr> <td>18</td> <td>-1406327236-01</td> <td>2311108</td> <td>679</td> </tr> </table>				1	1406323535-01	2221574	679	2	-140632539-01	2220682	217	3	-140632540-01	2220623	679	4	-140632551-01	0996283	679	5	-1406327034-01	2782241	679	6	-1406327216-01	2451821	679	7	-1406327219-01	2540241	679	8	-1406327220-01	2548323	679	9	-1406327221-01	2548236	679	10	-1406327223-01	2544592	679	11	-1406327224-01	2546162	679	12	-1406327225-01	2545666	679	13	-1406327226-01	2546621	679	14	-1406327228-01	2542556	679	15	-1406327229-01	2542556	679	16	-1406327234-01	2542470	679	17	-1406327235-01	2311110	679	18	-1406327236-01	2311108	679
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17	-1406327235-01	2311110	679																																																																								
18	-1406327236-01	2311108	679																																																																								
<input type="button" value="RP Worklist Sort Options"/>	Starting Key:	<table border="1"> <tr> <td>1</td> <td>1</td> <td>↓</td> </tr> <tr> <td>2</td> <td>RP Number</td> <td></td> </tr> <tr> <td>3</td> <td>BWS Sort Key</td> <td></td> </tr> <tr> <td>4</td> <td>Assigned Supplier</td> <td></td> </tr> <tr> <td>5</td> <td>Selected Supplier</td> <td></td> </tr> <tr> <td>6</td> <td>Status</td> <td></td> </tr> <tr> <td>7</td> <td>Expedite Code</td> <td></td> </tr> <tr> <td>8</td> <td>Need Date vs Lead Time</td> <td></td> </tr> <tr> <td>9</td> <td>Need Date</td> <td></td> </tr> <tr> <td>10</td> <td>Queue Date</td> <td></td> </tr> <tr> <td>11</td> <td>2 TI Part</td> <td></td> </tr> <tr> <td>12</td> <td>Mfg Part</td> <td></td> </tr> </table>		1	1	↓	2	RP Number		3	BWS Sort Key		4	Assigned Supplier		5	Selected Supplier		6	Status		7	Expedite Code		8	Need Date vs Lead Time		9	Need Date		10	Queue Date		11	2 TI Part		12	Mfg Part																																					
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4	Assigned Supplier																																																																										
5	Selected Supplier																																																																										
6	Status																																																																										
7	Expedite Code																																																																										
8	Need Date vs Lead Time																																																																										
9	Need Date																																																																										
10	Queue Date																																																																										
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<input type="button" value="OK"/>	<input type="button" value="Cancel"/>	<input type="button" value="Clear"/>	<input type="button" value="Set Defaults"/>																																																																								
<input type="button" value="Save Options"/>																																																																											
<input type="button" value="Set"/>																																																																											

Fig. 6

Buyer Workstation							
Work Lists	Admin	Support	RP Attachments	Actions	Display	Windows	F1=Help
RP 140637228 Item 01 Detail							
BWS Sort Key		Status BUYYW Queue Date 04/29/89 Sugg PO # Create Date 04/12/89					
RP # 140637228-01		JOHN DOE Responsibility 0					
Tracking # 0637228		Receivable Yes TI Inspect Yes Stock Yes					
Sub Items? No		Send MFG Part No					
Contingent Items? No		Rev _____ Pn Ctr 0					
Comments? No		DID _____ Mark _____					
System Messages? No							
Item Total \$ 10,200.00							
Item Type MTL Material							
Account Type Inventory							
TI Part # 2542556-0001							
MFG Part # _____							
Military Part # _____							
Description							
IC,SRAM,CY7C164,16K X 4,25NS							
Commodity 59624100							
IC DIGITAL MEMORIES							

Fig. 7

Buyer Workstation					
Work Lists	Admin	Support	RP Attachments	Actions	Display Windows
<input style="width: 100%; height: 100%; background-color: #cccccc; border: none; font-weight: bold; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Comments"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Schedules"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="1 Detail"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Status BUYW"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Queue Date 04/20/89"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Sugg PO #"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Create Date 04/12/89"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="JOHN DOE"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Responsibility 0"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Receivable Yes"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="TI Inspect Yes"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Stock Yes"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Send MFG Part No"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Rev _____"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Pln Ctr 0"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="DLD _____"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Mark _____"/>					
<input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="BWS Sort Key"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="RP # 1406372"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Tracking # 0637228"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Sub Items?"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Contingent Items?"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Comments?"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="System Messages?"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Item Total \$ 1,072.50"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Item Type MTL Material"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Account Type Inventory"/>					
<input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="TI Part # 2311097-0001"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="MFG Part #"/> <input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Military Part #"/>					
<input style="width: 100%; height: 100%; border: none; font-size: 10pt; color: black; text-align: center; padding: 5px; margin-bottom: 5px;" type="button" value="Description"/> <div style="border: 1px solid black; width: 100%; height: 100%; padding: 5px; margin-bottom: 5px;"> WARNES, DC WIRING </div> <div style="border: 1px solid black; width: 100%; height: 100%; padding: 5px; margin-bottom: 5px;"> Commodity 59951110 IC DIGITAL MEMORIES </div>					

Fig. 8A

Buyer Workstation					
Work Lists	Admin	Support	RP Attachments	Actions	Display
					Windows
F1=Help					
RP 140638092 Item 01 Detail					
Delivery Schedules					
Qty Ordered 25 Qty Unscheduled 0 Qty Requested 25 Balance to Schedule 0 Routing Transit Time 0					
Need Quantity Date Quantity Date 00/00/00 25 06/12/89 0 08/12/89					

Fig. 8B

Buyer Workstation					
Work Lists	Admin	Support	R/P Attachments	Actions	Display
Windows F1=Help					
RP 140638092 Item 01 Detail					
Quote Spreadsheet					
Unit Price	0.00	Base Price	130.00	Lowest Recent History	3,250.00
U/P	EA	Target Price		Extended Target	
Order Qty	25				
U/M	EA				
Add Supplier: No: 0 Name: _____					
Supplier	Status	SPM	Unit Quote	Extended Quote	Delta To Target
					Add To Date

Fig. 9

Buyer Workstation					
Work Lists	Admin	Support	RF Attachments	Actions	Display
<input style="width: 100%; height: 100%;" type="button" value="Search"/>					
<input style="width: 33%; height: 33%;" type="button" value="BWS Sort"/> <input style="width: 33%; height: 33%;" type="button" value="Commodity Search"/> <input style="width: 33%; height: 33%;" type="button" value="Supplier Search"/>					
<input style="width: 33%; height: 33%;" type="button" value="RF"/> <input style="width: 33%; height: 33%;" type="button" value="History Search"/> <input style="width: 33%; height: 33%;" type="button" value="Agreement Search"/>					
<input style="width: 33%; height: 33%;" type="button" value="Tracking"/> <input style="width: 33%; height: 33%;" type="button" value="Standard Clauses"/> <input style="width: 33%; height: 33%;" type="button" value="Create Date 04/12/89"/>					
<input style="width: 33%; height: 33%;" type="button" value="Su"/> <input style="width: 33%; height: 33%;" type="button" value="Forms Search"/> <input style="width: 33%; height: 33%;" type="button" value="Comments? No"/>					
<input style="width: 33%; height: 33%;" type="button" value="Contingent On Order"/> <input style="width: 33%; height: 33%;" type="button" value="System Messages? No"/> <input style="width: 33%; height: 33%;" type="button" value="Responsibility 0"/>					
<input style="width: 100%; height: 100%;" type="button" value="Item Total \$ 1,072.50"/>					
<input style="width: 100%; height: 100%;" type="button" value="Item Type MTL Material"/>					
<input style="width: 100%; height: 100%;" type="button" value="Account Type Inventory"/>					
<input style="width: 33%; height: 33%;" type="button" value="TI Part # 2548236-0001"/> <input style="width: 33%; height: 33%;" type="button" value="Rev _____ Pln Ctr 0"/> <input style="width: 33%; height: 33%;" type="button" value="DLD _____"/>					
<input style="width: 33%; height: 33%;" type="button" value="MFG Part #"/> <input style="width: 33%; height: 33%;" type="button" value="Military Part #"/> <input style="width: 33%; height: 33%;" type="button" value="Mark _____"/>					
<input style="width: 100%; height: 100%;" type="button" value="Description"/>					
<input style="width: 100%; height: 100%;" type="button" value="IC, RAM, DYN, 256K X 4-BIT, 100NS TACCPDI"/>					
<input style="width: 33%; height: 33%;" type="button" value="Commodity 59624120"/> <input style="width: 33%; height: 33%;" type="button" value="IC DIGITAL MEMORIES"/>					
<input style="width: 100%; height: 100%;" type="button" value=" "/>					

Fig. 10

Buyer Workstation									
Work Lists	Admin	Support	Actions	Display	Windows				
						F1=Help			
						Bws Sourcing Support			
<input type="text" value="0000000000"/> <input type="text" value="00000000"/> <input type="radio"/> TI Part Number <input type="text" value="219925-001"/>						<input type="text" value="00 Y"/> <input type="text" value="0000000000"/> <input type="radio"/> Supplier Name <input type="text" value="DSG"/>			
Buying Division # 014 DSG									
GROUP RATING									
Supplier	Group	Type	SSM	TIES	SPM	DVL	Qual	Price	\$ Loc Agm
- XYZ, INC	DSG	SM	C	No	1.10	020	100.		
- ABC CO.	DSG	SM	N	No	1.00	100	100		
- ALL CO.	DSG	M	A		N/A	N/A	N/A		

Fig. 11

Buyer Workstation	
Work Lists	Admin
Support	RPT Attachments
Actions	Display
Windows	
<input type="button" value=""/>	F1=Help
<input type="button" value=""/>	RPT 140637221 Item 01 Detail
<input type="button" value=""/>	Commodity Code Search - Alphabetic
Page To <input type="text" value=""/>	Assigned 59624120
Commodity Code <input type="text" value=""/>	Search For <input type="text" value=""/>
Description	
<ul style="list-style-type: none"> - 53500500 ABRASIVE MATERIAL/INCLUDES POLISHING COMPOUNDS) - 53500000 ABRASIVE MATERIALS - 53450000 ABRASIVES;DISKS & STONES - 60700100 ACCESSORIES, FIBER OPTIC - 72400000 ACCOUNT/CALCULATE MACH - 72409000 ACCOUNTING & CALCULATING MACH.,MISC. - 68502200 ACIDS, SPECIAL MIXES FOR CLEANING - 70250809 ACOUSTIC COUPLER, DP EQUIP, SPARE PART - 59601430 ACTUATOR, AXILIARY, SWITCH SENSITIVE - 13361000 ACTUATOR, EXPLOSIVE - 30100310 ACTUATOR, LINEAR - 30100320 ACTUATOR, ROTORY - 30100300 ACTUATORS - 16800200 ACTUATORS, AIRCRAFT ACC & COMP, MISC - 99052000 AD DISPLAYS - 60600100 ADAPTER, CONNECTOR, FIBER OPTIC 	

Fig. 12A

Fig. 12B

Fig. 13

Buyer Workstation				
Work Lists	Admin	Support	Actions	Display Windows
F1=Help				
PO Work List Specifications				
Supplier Abbr	Team Name	_____		
Supplier Number	Buyer Number	2284		
Po Number	Beginning Item Open Date — <u> </u> / <u> </u> —			
Item Type	All Unreceived — Delinquent — Overship —			
Change Request	Shipments Due Before — <u> </u> / <u> </u> —			
Receivable Y/N	Unscheduled Shipments —			
Payment Schedules	Account Type —			
Commodity Code	Cost Center —			
0	Work Order —			
Part Number	_____			
Std Ti Part Y/N	_____			
Mfg Part Number	_____			

Fig. 14

Buyer Workstation					
Work Lists	Admin	Support	Actions	Display	Windows
F1=Help					
Sel 0					
PO #	Status	Next Sched Date	Total Value	Part #/Description	
0023801835-01	PO O	01/10/95	0.10	SADEASDE	
- 002101865-01	PO O		1,997.00	COLOR SEPARATIONS	
- 002101885-02	PO O		0.00	COLOR SEPARATIONS	
- 002101885-03	PO O		0.00	COLOR SEPARATIONS	
- 002365962-01	PO O		1,108.00	LUGGAGE TAP (PPC)	
- 002372148-01	PO O		19,739.90	SLIDE SHOW	
- 002372284-01	PO O		7,676.25	PRINTING OF RESETS	
- 002372385-01	PO O		439.32	GAME PLAN COVER	
- 002372399-01	PO O		3,769.00	3-RING BINDER	
- 002372399-02	PO O		2,700.00	SLIP CASE FOR ITEM	
- 002372399-03	PO O		400.00	DISKETTE HOLDER	
- 002372433-01	PO O		2,555.35	BASELINE ART. SET	
- 002372452-01	PO O		60.97	MISCELLANEOUS ART	
- 002380020-01	PO O		5,088.00	CREATE ARTWORK FR	
- 002380033-01	PO O		7,770.00	880 PRINT USER	
- 002380033-02	PO O		3,195.00	QUICK REF. TEXT	
- 002380051-01	PO O		2,700.00	COMPLETION & REPORT	
- 002380076-01	PO O		995.00	PRINT FORMAT MUST	
- 002380182-01	PO O		1,111.92	HALF-HEIGHT WINDOW	

Fig. 15

Work Lists	Admin	Support	Ag																																																																																																																																																																																																																																																																
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Fig. 16

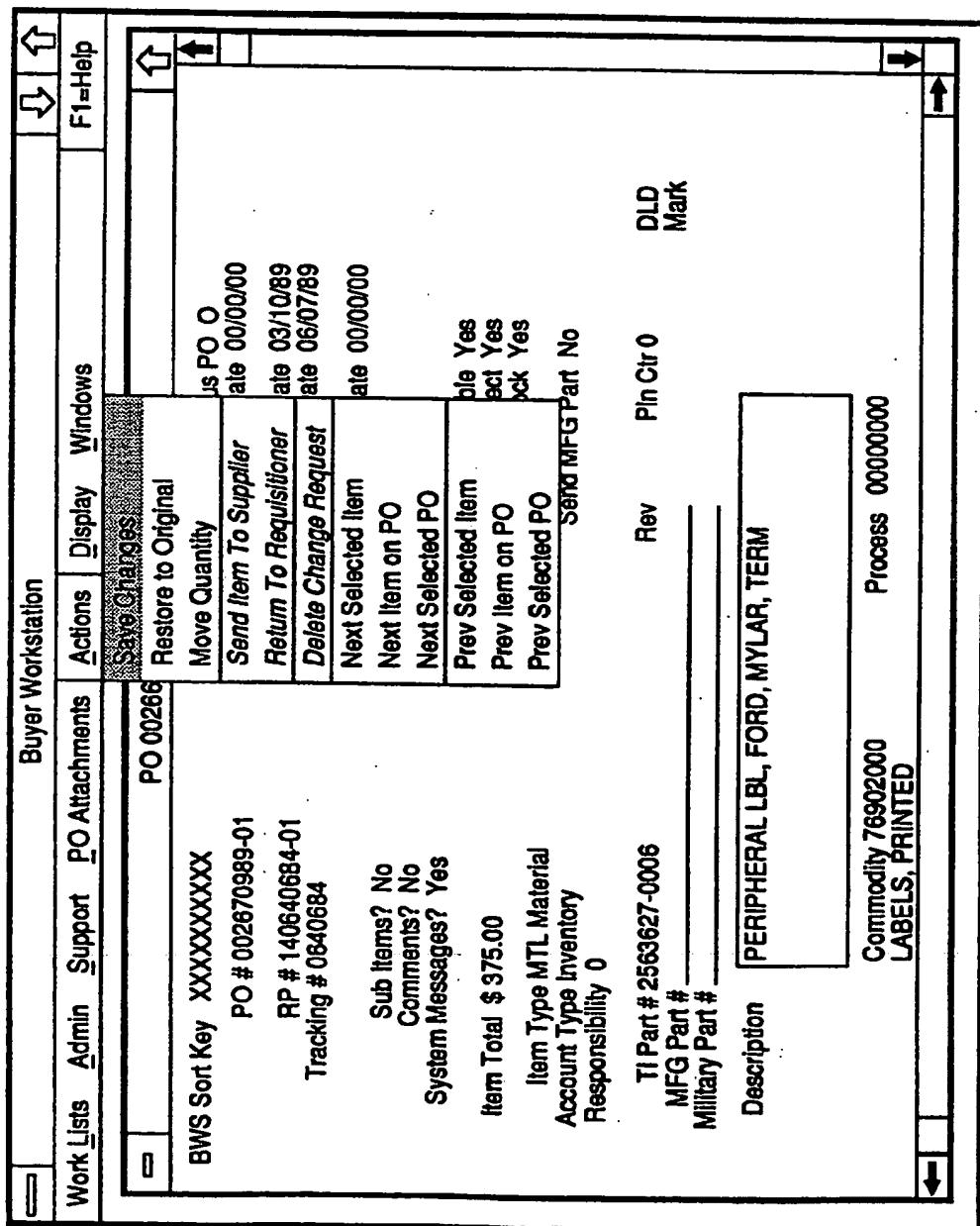
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Fig. 17

Fig. 18A

Buyer Workstation						
Work Lists	Admin	Support	Actions	Display	Windows	
			Send to Supplier	Send for Approval	Send for Signatures	F1=Help
Sel 1						
PO #						
002372385-01						
- 002101865-01						
- 002101865-02						
- 002101865-03						
- 002365982-01						
- 002372148-01						
- 002372284-01						
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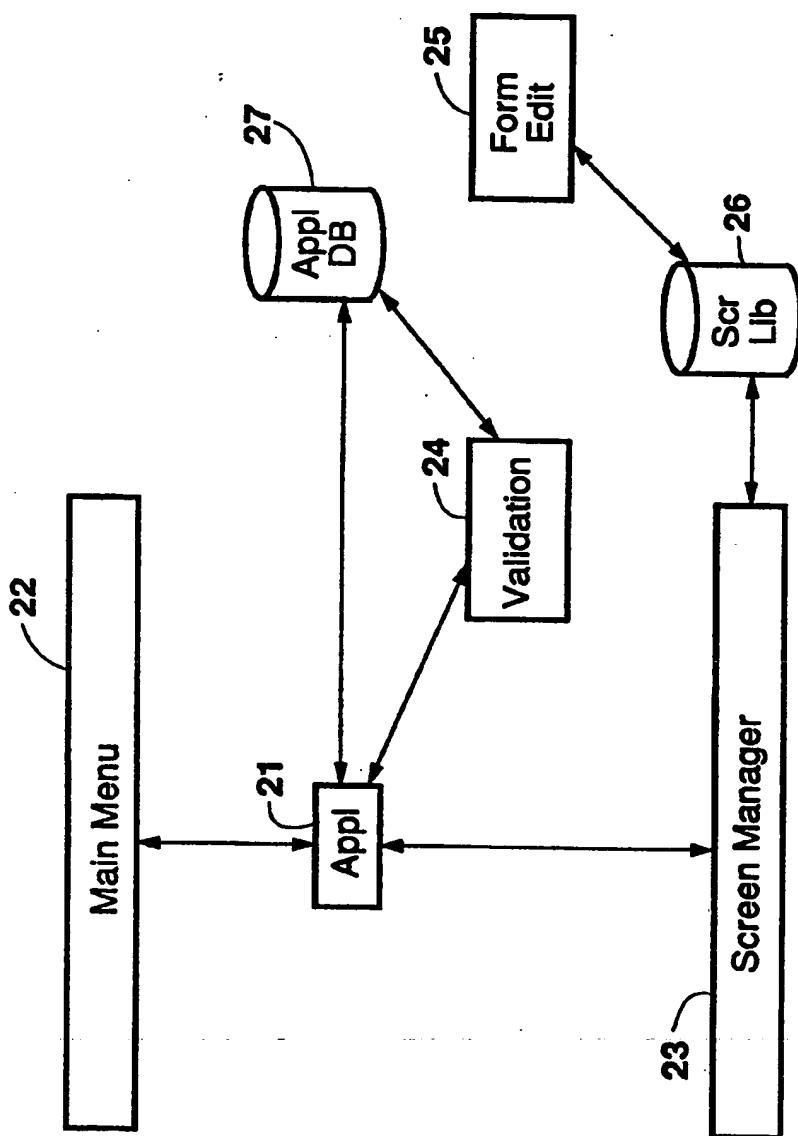


Fig. 19

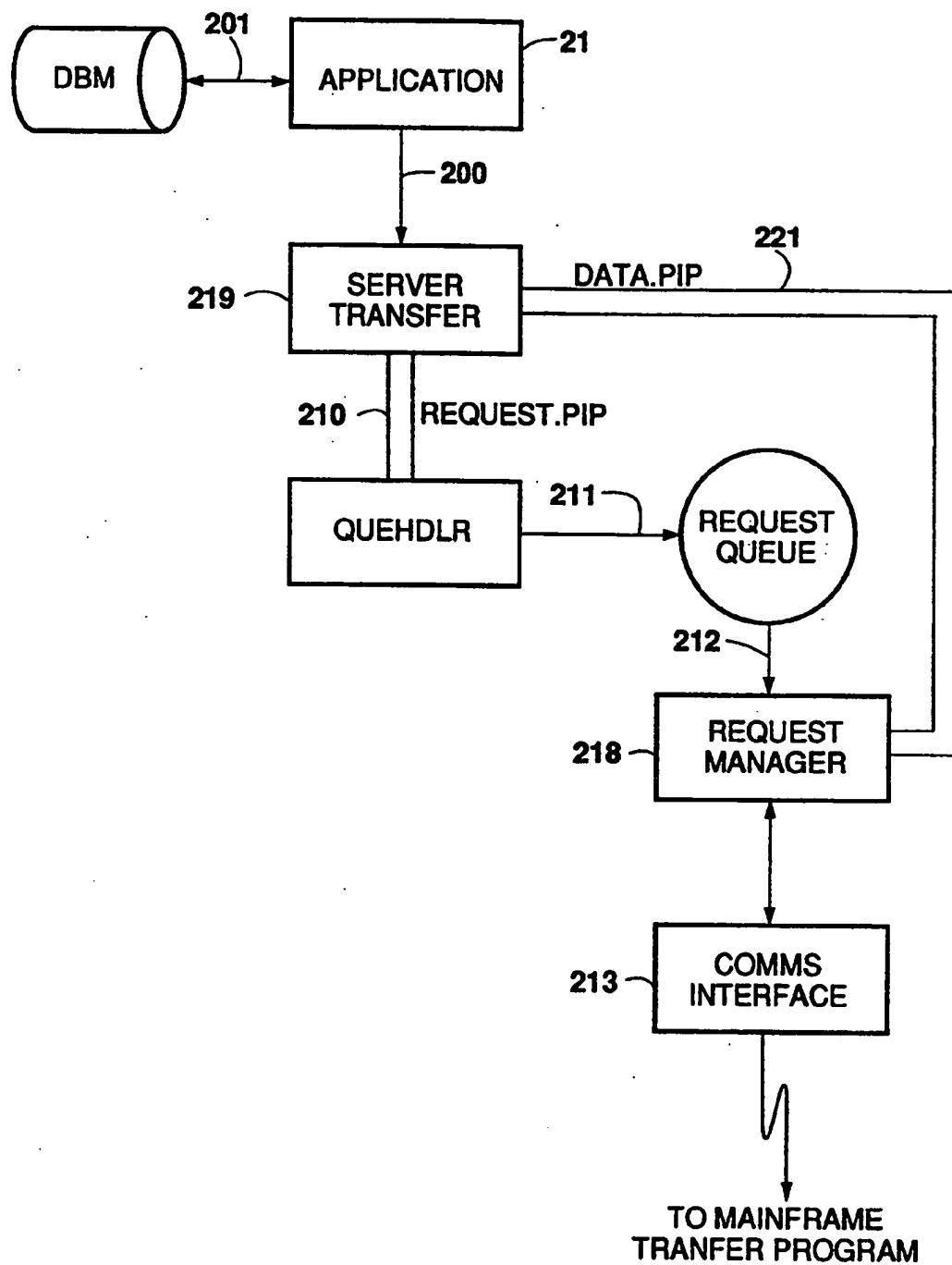


Fig. 20

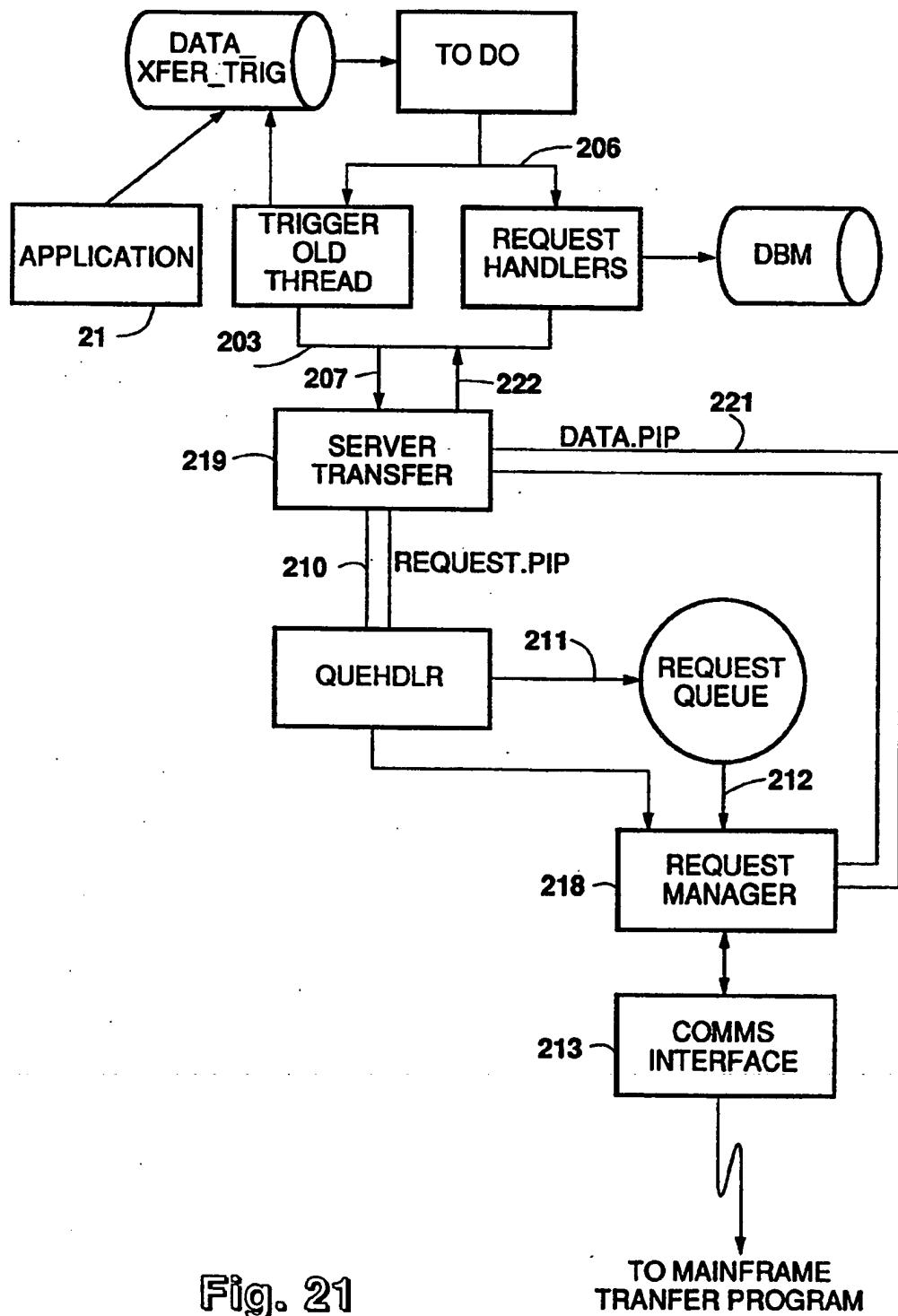


Fig. 21

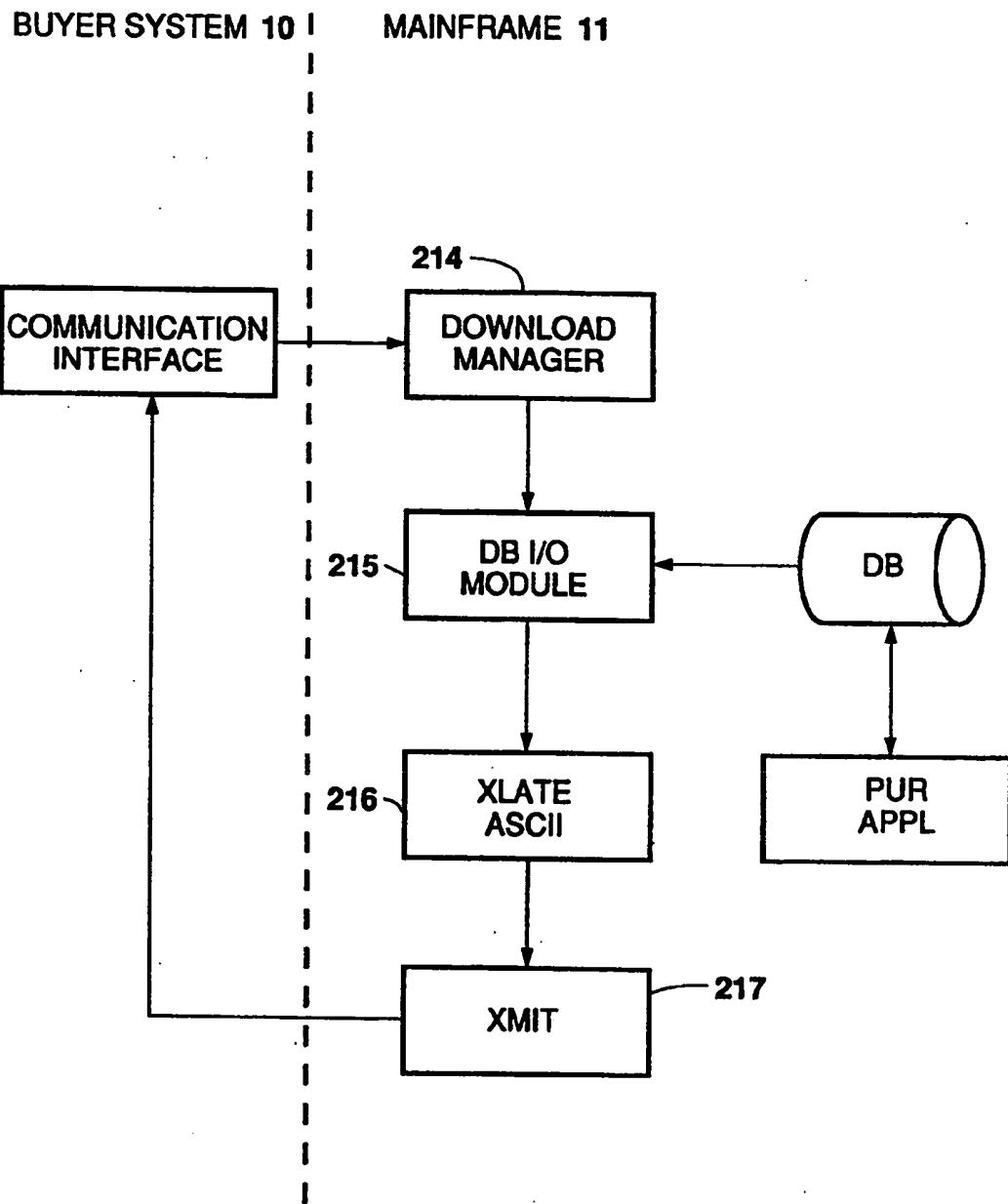


Fig. 22

AUTOMATED PROCUREMENT SYSTEM WITH MULTI-SYSTEM DATA ACCESS

TECHNICAL FIELD OF THE INVENTION

This invention relates to data processing computer systems, and more particularly to a computerized procurement system, which links multiple computer environments and which includes a buyer workstation that displays various procurement documents and accesses system-wide data.

BACKGROUND OF THE INVENTION

In any business, the procurement of products and services is likely to be a complicated process. Existing procurement methods involve handling a variety of documents, such as requests for purchase, purchase orders, purchase order change notices, and the like. These documents are printed and mailed or hand-delivered to various personnel types, such as managers, buyers, and suppliers. Each personnel type makes appropriate decisions, some based on information that is different than that used by other personnel types and some that are based on information that is global to more than one personnel type. Each personnel type uses or adds data contained in the procurement documents. During the process, a variety of retainment, copy, and attachment requirements apply to the different documents.

A need exists for an automated procurement system that reduces paper and provides electronic routing of appropriate information to all who are involved in the process. Ideally, the system should provide the information as needed by each person, with as little intervention by these users as possible.

One difficulty of providing such a system is related to the difficulty of transferring data among different computer systems. Existing computer systems are often categorized into three primary groups: mainframes, minicomputers, and microcomputers. Each of these groups uses different operating systems and different data formats. Although significant advances have been made in networks that link computers that are designed for compatibility, not all computer systems are easily linked and as a result, data transfer from one type of system to another is difficult.

Another difficulty in providing an automated procurement system is overcoming long-standing traditional methods of handling and routing documents. The system must provide an interface to the buyer that is easy to use, yet fulfills the demands of what can become a complex pattern of back and forth paper trails. In data processing involving the manipulation of large amounts of data, mainframe computer systems have traditionally been used. However, most advances in interactive data entry and decision-making have been in connection with smaller computer systems, often microcomputer or minicomputer-based and referred to as workstations.

An object of the invention is to combine the advantages of database capacity using mainframe computers and the advantages of user-interfacing using workstations, for automating the procurement process.

SUMMARY OF THE INVENTION

One aspect of the invention is an automated procurement method, using an interactive workstation having a local database and a buyer interface, in communication with a mainframe having a global database. The local workstation displays various documents used for pro-

curement, which include information that is already supplied as well as queries for data to be filled in by a buyer. The buyer selects a particular document to be processed, and either the workstation or the buyer determines what support data is needed for processing the selected document. If the data is in the global data base, transfer software retrieves the data from the global database. Other programming displays the data at the workstation, receives data input from the buyer, and routes the document to other personnel involved in the procurement process. Regardless of whether the global data is supplied automatically or is requested by the buyer, the fact that its source is the mainframe rather than the workstation is transparent to the buyer.

A technical advantage of the invention is that paper flow in the procurement process is greatly reduced. The invention routes electronic documents to appropriate persons during the procurement process. Based on input data, business procedures, and data base information, the invention determines what data is required at each workstation and determines the correct path upon which to route documents. The invention simulates the paper trails typical of procurement, including attachments, approvals, and retention requirements.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating the various computer systems in communication with a mainframe, each used as part of a procurement process.

FIG. 2 illustrates the user interface of the workstation of FIG. 1, in particular, a buyer statistics window.

FIG. 3 illustrates the user interface of the workstation of FIG. 1, in particular, a work list menu.

FIG. 4 illustrates the user interface of the workstation of FIG. 1, in particular, a RP work list window.

FIG. 5 illustrates the user interface of the workstation of FIG. 1, in particular, a RP work list sort menu.

FIG. 6 illustrates the user interface of the workstation of FIG. 1, in particular, an opened RP document.

FIG. 7 illustrates the user interface of the workstation of FIG. 1, in particular, an RP attachments menu.

FIG. 8A illustrates the user interface of the workstation of FIG. 1, in particular, a delivery schedule attachment window.

FIG. 8B illustrates the user interface of the workstation of FIG. 1, in particular, a quotes attachment window.

FIG. 9 illustrates the user interface of the workstation of FIG. 1, in particular, a support data menu.

FIG. 10 illustrates the user interface of the workstation of FIG. 1, in particular, a sourcing search window.

FIG. 11 illustrates the user interface of the workstation of FIG. 1, in particular, a commodity search window.

FIGS. 12A and 12B illustrate the user interface of the workstation of FIG. 1, in particular, action menus for a RP work list and an opened RP, respectively.

FIG. 13 illustrates the user interface of the workstation of FIG. 1, in particular, a PO work list specification menu.

FIG. 14 illustrates the user interface of the workstation of FIG. 1, in particular, a PO work list window.

FIG. 15 illustrates the user interface of the workstation of FIG. 1, in particular, a PO work list sort menu.

FIG. 16 illustrates the user interface of the workstation of FIG. 1, in particular, a opened PO window.

FIG. 17 illustrates the user interface of the workstation of FIG. 1, in particular, a PO attachments menu.

FIGS. 18A and 18B illustrate the user interface of the workstation of FIG. 1, in particular, action menus for a PO work list and an opened PO, respectively.

FIG. 19 illustrates the structure of the programming for one of the workstations of FIG. 1.

FIG. 20 illustrates the interactive data transfer process of a buyer system.

FIG. 21 illustrates the batch data transfer process of a buyer station.

FIG. 22 illustrates the data transfer process of a mainframe for both interactive and batch data transfers.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates a procurement system, with which the invention is designed to be used. Several user systems are each in communication with a mainframe system 11. The user systems include buyer system 10, 20 requisitioner system 12, supplier system 14, and manager system 13. As explained below, each user system may include standard computing equipment, such as a processing unit, communications interface, display screen, printer, and memory.

As explained below, the operating systems and applications programs of these user systems are not necessarily compatible. In fact, an advantage of the invention is that it provides access to global data that each of these systems may generate or use. Although examples of operating systems and applications for each system are described, these could be varied, with general concepts of the invention remaining the same.

Buyer system 10 is a system of buyer workstations 20, in communication with each other by means of a server 19. A user of a workstation 20 is referred to herein as a buyer. In the preferred embodiment, each buyer station 20 is a micro-computer, using an operating system known as OS/2. Various terms associated with OS/2 are used throughout this description, and are known to those familiar with OS/2.

The applications programs used with buyer station 10 include a database manager, which is a relational database. Other applications programming includes buyer interface software, which is described below in connection with FIGS. 2-19.

Server 19 provides data distribution to each workstation 20. Some of this data, which is common to all users of all workstations 20 is stored on server 19 and shared by all workstations 20. Other data may be stored at a 50 workstation 20. Both types of data are referred to herein as "local data", as opposed to "global data" stored in mainframe 11.

An important aspect of the invention is a method of transferring data between buyer system 10 and mainframe system 11. The process of transferring data to buyer system 10 from mainframe system 11 is referred to herein as "downloading", whereas the process of transferring data from buyer workstation 10 to mainframe system 11 is referred to as "uploading". The programming of workstation 20 and server 19 programming that implement these processes are described in further detail below in connection with FIGS. 19 and 20.

In a typical procurement system, a number of buyer 65 stations 20 are linked in a local area network (LAN), served by server 19. As will be explained below, however, server 19 is different from typical LAN servers in

that it serves both the workstations 20 and mainframe 11. Also, the invention is not limited to local area networks, and the functions of server 19 and workstation 20 may be combined in a single computer unit. In this 5 situation, the transfer software runs in the background while the buyer interacts with the application software in the foreground.

Mainframe system 11 includes at least one database, which stores global data to be accessed by one or more of the user systems. An example of mainframe system 11 is a mainframe computer system manufactured by IBM Corporation, using the MVS operating system and an Information Management System (IMS) teleprocessing monitor for interactive access via terminals. Although 15 the following description is in terms of a single mainframe system 11, more than one mainframe computer may be in communication with each other as mainframe 11, provided that data downloading and uploading includes a means for identifying them.

The user systems other than buyer system 10 may be LAN systems, stand-alone workstations, or mainframe systems. A typical configuration is a mainframe system combined with local stations, which operate either as terminals or as workstations running local applications 25 programming. Although the following paragraphs describe the user systems other than buyer system 10 in terms of specific configurations, the functionality of these user systems can be accomplished with different configurations and the concepts of the invention described herein are the same.

In the embodiment of this description, requisitioner system 12 and manager system 13 are mainframe systems, for example, mainframes using the IMS teleprocessing monitor. The applications programs for these mainframes use relational databases, such as Database 2 (DB2), manufactured by IBM Corporation. Examples of a requisitioner system 12 and manager system 13 are the EZ REQ system and the Electronic Routing and Approval (ERA) system, both manufactured by Texas Instruments, Inc.

Supplier system 14 is a mainframe and IMS system and uses DL/I database application programs. An example of a supplier system is the TI Information Exchange System (TIIES), manufactured by Texas Instruments, Inc. The mainframe links with DOS workstations having databases, such as Btrieve, manufactured by Softcraft, Inc.

Buyer Workstation Interface

The user interface of each buyer workstation 20 is designed to handle a large volume and variety of data. A number of display panels are used to display and process this data. This visual presentation is modeled after a design approach known as multiple document interface, which includes a set of design rules for presenting multiple documents or different views of the same data in a consistent manner. A method of implementing a multiple document interface is the use of child display windows that operate under a top level parent window.

In the preferred embodiment, the user interface is implemented with the Presentation Manager shell, which is a well known companion to the OS/2 operating system. This permits the use of multiple display windows. A main menu process acts as the parent window for all buyer applications and manages their windows.

Consistent with the above design approach, each workstation 20 provides the buyer with appropriate documents for use during the procurement process. These documents are presented on a display screen as windows, with data fields to be considered by or to be filled in by the buyer, in a manner analogous to the data on forms and reports used in traditional non-automated procurement methods. Furthermore, each workstation 20 routes these documents to and from the various user systems as needed, with appropriate copies and attachments.

To provide these documents in an orderly manner, the application software for each workstation 20 includes processes for providing the buyer with documents, such as requests for purchase (RPs) and purchase orders (PO's). It displays these documents in display windows, and the buyer selects actions from command bars and menus. Buyer input is by means of a keyboard or mouse, or a combination of both. As will be evident from FIGS. 2-19, the invention is designed so that buyer input is facilitated with pick and choose selections via a mouse.

FIG. 2 illustrates a buyer statistics window 21, which informs the buyer of RPs and PO's assigned to the buyer's workstation 20. This window is obtained by means of the Admin command on the command line 22. The programming of workstation 20 automatically updates the data in this window 21.

FIG. 3 illustrates a work list menu 31, which is obtained by means of a Work List command on command line 22. As shown, various types of work lists may be obtained, including those listing RPs and PO's, as well as other types of documents. The particular work lists displayed on a workstation 20 contain documents assigned to the workstation 20. The reverse video 32 is a standard menu selection means.

As an example of work lists, communications between requisition system 12 and buyer system 10 permit a workstation 20 to inform a buyer that RPs require processing. In a typical procurement system, RPs are sent to a manager for approval, a step that the invention implements with manager system 13. Then, communications and application programming causes a list of RPs to be presented to the buyer on the display of workstation 20. Thus, a RP work list contains all RPs assigned to a workstation 20. The programming automatically updates the work list contents as new RPs are added and old RPs become PO's. Other work lists may list other procurement documents, such as PO's and requests for return, for which processing is to be done.

FIG. 4 illustrates an RP work list 41 obtained by selecting an appropriate command from the menu of FIG. 3. The work list represents each RP in a compressed form, having a single line of the most pertinent data contained in the RPs.

FIG. 5 illustrates a work list sort menu 51, which permits work lists to be sorted by various data fields. Referring again to FIG. 4, work list 41 is sorted in RP number sequence. However, using menu 51, selection criteria other than RP number may be used. Menu 51 may also be used to change the worklist data fields displayed in work list 41.

FIG. 6 illustrates an RP that has been opened, so that additional information is displayed. This opened RP 61 represents the data that would be contained on a hard copy RP in a non-automated system. The data fields include such items as part number, description, commodity code, supplier, and shipping destination. Some

data is supplied by other user systems, such as an RP number or a suggested supplier from requisition system 12, or comments and price approvals from manager system 13. Additional data fields may be included by scrolling the window. Some of the data fields are protected, for buyer viewing only. Other data fields are unprotected for receiving buyer input.

FIG. 7 illustrates a document attachment menu 71, which permits attachments to be viewed, created, or updated on a workstation 20. These attachments include comments for keeping notes, special schedules, sub-items, special clauses, quotes, routing, and other supplemental attachments that simulate those used in a non-automated procurement process. Attachment menu 71 is a submenu of an opened RP window 61.

FIG. 8A illustrates one of the attachments available using the menu of FIG. 7, a delivery schedule window 81. Use of the Actions command 82 permits the buyer to add or modify data fields in this window. FIG. 8B illustrates a second attachment available using the menu of FIG. 7. This attachment permits a buyer to send and receive quotes. The returned quotes are one of several decision aids provided by the user interface.

When the buyer selects a particular document for processing, the programming of workstation 20 has previously determined what support information the buyer will most likely be using when the documents were downloaded. This decision is based on selected parameters, such as the buyer's division and purchasing history. The data is copied to a database on workstation 20 or accessible to it via server 19, such that it becomes local data. However, as explained below, the programming also permits the workstation to receive non-local data during document processing, either automatically or in response to buyer actions.

FIG. 9 illustrates a support data menu 91, which enables each workstation 20 to provide the buyer with supplemental data to help make purchasing decisions. Support information software is used to provide the buyer with administrative and decision-making data. For example, the buyer may obtain lists of suppliers and associated data such as prices, terms, and quality and delivery ratings.

As shown in FIG. 9, support data includes sourcing data, commodity searching, supplier searching, history searching, standard clauses, and on order data. The supplemental data is assigned to any open RP at the option of the buyer, who uses menus and command lines to select data categories and search fields.

FIG. 10 illustrates a sourcing search window 101, obtained by using the sourcing command of menu 91. Sourcing data is requested by a buyer who seeks purchasing information for a particular supplier or item. As an example of a sourcing process, a list of suppliers, ranked according to certain criteria is provided to the buyer. The criteria include characteristics such as quality and delivery, and each is given a numerical value, from which algorithmic or artificial intelligence techniques may be used to determine rankings.

FIG. 11 illustrates a commodity search window 111, obtained with the commodity search command on menu 91. Commodity data includes commodity codes and commodity descriptions. Other search windows (not shown) may provide various other data categories. Supplier data includes identification number, name, and address. History data includes past purchasing information on a particular item. Standard clauses are additional terms and conditions that the buyer may select to ac-

company a purchase order. On order data includes RP's and PO's that are currently on order. Each of these data categories has a number of data fields, and may be searched with respect to a selected field. For example, a buyer may search the commodity data using either the code or description as a search field.

FIGS. 12A and 12B illustrate action menus 121 and 122 for an opened RP and an RP work list, respectively. In addition to viewing work lists, opening documents, and obtaining supplemental information, the buyer may "act" on a document. These actions are the equivalent of handling hard copies of a document in a non-automated system. As shown, Actions may be selected from either an open document window as in FIG. 12A or a work list window as in FIG. 12B. Performing an action from a work list affects all listed documents that have been marked by the buyer. Performing an action from an open document affects only that document.

FIG. 13 illustrates a PO work list specification window 131. This window permits the buyer to create a PO work list that includes only PO's that meet selected criteria. For example, the buyer may create a work list of PO's for the same supplier.

FIG. 14 illustrates a PO work list window 141. The data in this window is automatically updated as the buyer receives new PO's and as existing PO's become filled orders. Once data is verified by mainframe 11, an RP is removed from the RP work list 41 and added to the PO work list 141.

FIG. 15 illustrates a PO work list sort menu 151, which permits the buyer to sort the PO work list 141 according to various data fields. For example, the work list 141 may be sorted by total value of the order.

FIG. 16 illustrates an opened PO window 161. Like opened RP's 61, opened PO's 161 represent data that would be contained in a hard copy PO of a non-automated method. Data fields in the PO may be protected or unprotected from input or modification by the buyer.

FIG. 17 illustrates a PO attachments menu 171. Like the RP attachments menu 71, PO attachments menu 171 permits the buyer to view, create, and update attachments that simulate those used in standard non-automated procurement systems. The attachments are the equivalent of the various physical documents that would be attached to a PO.

FIGS. 18A and 18B illustrate action menus 181 and 182 for PO work lists and opened PO's respectively. In a manner similar to actions taken with respect to RP's, the actions available from the PO action menu permit the buyer to select actions that are carried out by workstation 20 to simulate the procedures and routing of a non-automated system.

A feature of the invention is that printouts can be easily generated to provide hard copies of procurement documents and reports. These printouts can be generated either on-site for delivery to entities external to the system, or at a designated destination so that manual delivery is avoided.

FIG. 19 illustrates the programming architecture of the software programs of buyer station 11 that manage the user interface. The general design of the programming surrounds application programming 21 with a layer of utility programs, which provide application-specific and generic services beyond those provided by OS/2 software. Thus, the application programming 21 is freed of the tasks of interfacing with the PM services of OS/2.

In addition to application program 21, the components of the workstation 20 software are main menu 22, screen manager 23, validation functions 24, form edit 25, and a screen library 26. These utilities are closely coupled and in constant communication with each other. Each calls upon the others to perform services on behalf of application program 21.

Application program 21 is primarily a collection of screens to be presented to the buyer and tasks written for each screen. The task registers its window procedure with PM, calls a function of screen manager 23 to create a screen window, and calls another function of screen manager 23 to read the screen. Before the screen is displayed, non-literal fields are initialized, which may include a call to obtain current values from linked fields on other active screens.

Application program 21 dynamically modifies menu items entries to indicate what options are currently available to the user. This is accomplished by sending messages to main menu 22 when changes in menu choices are needed.

Main menu 22 is a driver program that controls the main menu and begins a task when the corresponding menu item is selected. When the buyer selects a menu item, main menu 22 notifies the application program 21, which then acts appropriately.

Screen manager 23 is a collection of routines that simplify screen management with an OS/2 PM menu driver interface. Screen manager 23 also controls buyer input via a mouse and keyboard. Screen manager 23 permits data fields on multiple screens to be linked so that when a field on one screen changes, fields on other screens that contain the same data are updated. Screen manager 23 has functions that handle window management functions, such as sizing, moving, and scrolling.

As a buyer runs an application program 21, the buyer can enter new data in data fields on the display of workstation 11. Screen manager 23 notifies the application program 21 of the change. Application program 21 causes validation of the data by invoking the validation functions 24. Validation involves such tasks as determining whether the data type is proper or whether data is factually true. An example of the latter is determining whether a supplier number is for an existing supplier.

Form edit 25 is a utility program used for designing screens. It maintains a disk file library of all screens, with a screen being comprised of a group of field descriptions. Fields can be of several format types, including text, numeric, list-box, edit-box, push-button, data, or zipcode formats. Each field may be given a name, which is used by a task to reference that field. Each field is located by the row-column position on the display screen, and its size is measured in terms of rows and columns. Colors are used to differentiate literal, protected, or unprotected fields, with literal fields being those with static data that is usually never changed. Other fields usually have initial values assigned by the task. Unprotected fields may be changed by the buyer. Fields have various attributes used to select visibility, keyboard protect status, numeric edit functions, text justification, etc. These attributes control how the field is displayed by screen manager 23. Field values and attributes may be changed and queried by the task using functions from screen manager 23. Different versions of these functions control different data types.

During run time operations, the tasks of applications program 21 use various messages, which are standard for OS/2 and PM. After initialization, the task enters a

message loop to wait for and then respond to received messages, until it receives a WM_QUIT message. The task specifies a default window procedure, rather than a PM equivalent. All regular PM messages come to the task's window procedure, and the task gets priority to these messages. The task may ignore a message, in which case the message is handled by screen manager 23.

Application task message handling is mostly concerned with changes made to input fields and actions selected by the buyer. Most messages that are sent to the task concern a specific field, which is identified by field name.

One field attribute is notify, which a task may use to specify that it wants a notification message about any key stroke or any mouse click that happens in that field. Such messages identify the input that occurred and the field. An example, is a pushbutton field, which can be related to when a mouse button is pressed and which button. Screen manager 23 converts PM mouse messages, identified by pixel coordinates where the mouse clicked, to a workstation 11 mouse message which identifies the field name.

A task receives a validation message if the buyer modifies data in a field and attempts to move to another field. The task may then query the current value of the field, verify it, and refuse to permit the user to leave the field if the modification is unacceptable. If the buyer clicks on a menu or a close command after attempting to modify a field, the task intercepts the WM_CLOSE and WM_COMMAND messages, and calls a procedure that forces an immediate validation message for the field.

List-box fields are a special case, which require a series of messages requesting each additional line of data for the box. Initially, and again each time the field is scrolled, additional data is requested. Only enough data is requested to fill the visible part of the box. These messages are in the form of GetFirst, GetLast, GetNext, or GetPrevious queries. A line of data is returned to the task to be used as a key to obtain the next line, so that the task need not be involved with scrolling functions. When the buyer selects a list-box line the data on that line is returned to the task for identification of the line. Such selected lines can be marked visibly for the buyer, and are treated two ways as requested by the task—either all other lines are unmarked so only one is selected or all other lines are left as is so that several can be selected.

After an application program 21 receives and validates input from the buyer, it typically performs numerous database calls. These calls use the Structured Query Language (SQL) interface to retrieve, update, insert, and delete data columns and rows on the tables in the local database 27. Most of the code and logic of applications program 21 substantially involve database access to acquire the necessary data fields to populate screen displays for buyer interaction.

Global Data Downloading

FIGS. 20-22 illustrate the process of providing "transparent" access by workstation 20 to global data, which is stored on mainframe system 11. Two types of access are provided: interactive and batch. FIGS. 20 and 21 illustrate the transfer of data within buyer system 65 20 for interactive and batch access, respectively. FIG. 22 illustrates the transfer of data between mainframe 11 and buyer system 10 for both types of access.

Referring to FIG. 20, the interactive transfer process is used when a buyer is working on a document and needs data not found on the local database. In step 200, application program 21 determines that global database access is required and calls a server transfer program to download the data from mainframe 11. The server transfer program is described in further detail below.

The batch process is used in a number of different situations. Some examples of batch data transfer are: (1) 10 when a new document is created or updated by a user system, such as requisitioner system 12, (2) when a locally updated document is validated, or (3) when a local document is processed such that it is to be sent to another queue, for example, an RP to PO conversion. The batch 15 process is based on triggers, which are database records that represent a logical set of data that is to be moved between a local database of buyer system 10 and mainframe 11.

Thus, as indicated by step 203, server 19 continually 20 polls mainframe 11 for triggers. In step 204, the triggers are downloaded and stored in a local trigger table. Also, as indicated by step 205, application program 21 may insert triggers locally, such as in the cases of examples 25 (2) and (3) in the preceding paragraph.

In step 206, a dedicated trigger to-do list process, 30 which runs on server 19, schedules each trigger to a request handler that is appropriate for the request depending on the type of data requested and its location within mainframe 11. To-do list process is essentially a queue manager.

Referring to FIGS. 20 and 21, in both the interactive and the batch data transfer, the server transfer program transfers data between buyer system 10 and mainframe 11. FIGS. 20 and 21 illustrates various modules and 35 functions of this server transfer program.

In the batch data transfer process, the request handler calls the server transfer program to initiate a transfer request. In the interactive data transfer process, the request is generated as a part of the application program 40 21 and a queue manager is not necessary. In both processes, the request contains information about the direction of data flow, i.e., whether it is to be uploaded or downloaded, the type of data, and the identity of the mainframe if the mainframe system 11 has more than 45 one mainframe.

In step 210, the request is sent to a queue handler via 50 an OS/2 named pipe. In step 211, the queue handler inserts the request into an OS/2 IPC queue for scheduling.

In step 212, a request manager reads the request from 55 the queue. In step 213, a communications interface formats the data to an IBM 3270 structured field buffer for transmission to mainframe 11. The communications interface uses 3270 emulation software.

Within the structured field buffer is an IMS transaction code, which specifies what type of transfer is to occur and what IMS system the transaction should be executed on. The IMS transaction code, together with its associated structured fields are processed through 60 the IMS message format service bypass mode.

Referring now to FIG. 22, the mainframe transfer program receives the request from the server transfer program in the form of the structured field buffer. FIG. 22 illustrates various modules and functions of this 65 mainframe transfer program.

In the case of downloads, in step 214, a download manager receives the request and passes it to a request-unique DB I/O module, depending on the type of data

requested and where it resides on the mainframe databases. This request-uniqueness is similar to the uniqueness in the request handlers of the generic transfer system.

In step 215, the DB I/O module obtains the requested data. For each row of data, the DB I/O module provides a descriptor table, which itemizes the types and sizes of each data column. Although this description assumes the source data is in a DB2 table, this is not necessary to the invention. The primary characteristic of the source data is that it may be described as data types appropriate for the particular database.

In step 216, the mainframe transfer program translates the outbound data from EBCDIC to ASCII. Each DB2 row is translated to a corresponding OS/2 DBM format row. The result is one or more structured field messages containing the requested data. This message is referred to herein as the "mainframe response". In step 217, the mainframe response is transmitted to buyer system 10.

Referring again to FIGS. 20 and 21, in step 218, the request manager receives the mainframe response from the mainframe transfer program. The request manager examines flags in the response header to determine if the download is finished or in-progress. The download is treated as being in-progress if the request represents more data than can be transmitted in a single IMS transaction. In that situation, the data is buffered and the IMS transaction is re-scheduled.

In step 219, the server transfer program returns each data record to the request handler via another OS/2 named pipe. The data is then inserted into the local database in the case of batch data transfers or passed to application program 21 in the case of interactive data transfers. Also, the appropriate worklist is notified, using a notification message, to display the new data.

Data Uploading

In data uploading, the source of the data is buyer system 10 instead of mainframe 11 and the destination for the data is mainframe 11 instead of buyer system 10. Uploading is initiated by a workstation 20 when a workstation application has changed data, and as a result the data must be validated or updated on a data base of a mainframe.

In the first step, application program 21 places an upload request into a workstation queue. The data items in the queue are flagged to prevent further user changes to that data until the upload is complete. The remaining steps of the data uploading process are the reverse of those described above for the downloading process. The upload process of the mainframe transfer program is similar to the download procedure, except that an upload manager replaces the download manager. Mainframe 11 returns an acknowledgement instead of downloaded data.

Other Embodiments

Although the invention has been described with reference to specific embodiments, this description is not meant to be construed in a limiting sense. Various modifications of the disclosed embodiments, as well as alternative embodiments will be apparent to persons skilled in the art. It is, therefore, contemplated that the appended claims will cover all modifications that fall within the true scope of the invention.

What is claimed is:

1. A method performed by a computer system implementing an automated procurement system including a mainframe computer, a global database, a local database and a server computer, comprising the computer performed steps of:

storing global data in said global database of said mainframe computer, said mainframe computer being programmed with mainframe transfer software;

storing local data in said local database of said server computer, said server computer being programmed with server transfer software so that said server computer is in communication with said mainframe computer;

controlling by said server computer a workstation for interactive input and output with a buyer, said workstation being programmed with a buyer interface, and said workstation being in communication with said server computer;

accessing said buyer interface to permit said buyer to process procurement documents;

determining by said server computer whether process data corresponding to said process of said procurement documents is located in said global data in said global database or in said local data in said local database;

controlling by said computer system a manager system to approve said procurement documents after said procurement documents are processed; and

providing, by said mainframe transfer software and said server transfer software, said process data to said buyer so that a location of said process data is determined without interaction of said buyer; and wherein the method further comprises the step of supplying said global data from said global database for use by said buyer for decision-making; and wherein said global data includes supplier rankings including criteria data to rank each supplier with respect to other suppliers, and the method further comprises the steps of determining by the computer system said supplier rankings, displaying said supplier rankings on said workstation, and receiving input from said buyer responsive to said supplier rankings.

2. A method performed by a computer system for automated procurement, using an interactive workstation having a local database and a buyer interface, in communication with a mainframe having a global database, comprising the computer performed steps of:

displaying a plurality of documents used for procurement on said workstation, said documents including queries for data to be supplied by a buyer;

selecting a document on said workstation from said documents;

determining by said workstation whether support data is needed for processing said selected document and supporting said selected document is located in said global database;

retrieving by said workstation said support data from said global database if needed to support said selected document in accordance with said determining step;

displaying said support data on said interactive workstation if needed to support said selected document in accordance with said determining step;

ranking by said computer system suppliers to rank each supplier with respect to other suppliers in response to a request for said support data;

receiving input data from said buyer in response to displaying said support data for processing said document, by using said buyer interface; and updating and maintaining said support data so that said support data in said local database is the same as said support data in said global database by said computer system.

3. The method of claim 2, wherein said method further comprises the step of routing said document to appropriate users of other computer systems, said other computer systems being in communication with said mainframe.

4. The method of claim 2, wherein said method further comprises the step of using said workstation to

inform said buyer of a worklist of documents requiring processing.

5. The method of claim 4, wherein said worklists include a line of data representing a single document and the method further comprises the step of selecting an additional document from said worklist to be initialized for display of additional data.

6. The method of claim 4, wherein said method further comprises the step of sorting said worklist according to a data field selected by said buyer.

7. The method of claim 2, wherein said method further comprises the step of selecting and processing attachments to said selected document by said buyer.

8. The method of claim 2, wherein the method further comprises the step of determining said support data needed for processing, by using said buyer interface.

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